

northward. No. IV, after a slow movement over the British Northwest, advanced with greatly increased velocity from northwestern Lake Superior to western Pennsylvania, where it was joined by a second section, which first appeared in Arizona and had come up by way of southern Texas; the combined storm then moved off the New Jersey coast. No. VI originated in Wyoming, moved south-southeastward to extreme northeastern Mexico, thence north-northeastward to western Indiana, where it dissipated. No. VII was really a secondary development of No. VI, moving up from the western Gulf of Mexico to the westward of the Appalachian Range, over the lower Lake region, and thence east-northeastward. No. XII first appeared in extreme southern Florida, moved along the coast with steadily increasing intensity to New England, and finally disappeared north of the mouth of the St. Lawrence River. This storm and No. X developed the lowest pressures of the month.—*H. C. Frankenfield, Forecast Official.*

### RIVERS AND FLOODS.

At the beginning of the month the Mississippi River was practically frozen over as far south as Cairo, Ill., and remained so during the entire month as far south as Leclaire, Iowa. Below Leclaire, however, the ice moved out on various dates, commencing on the 1st at St. Louis, Mo., and on the 20th at Davenport, Iowa. The gorge at St. Louis lasted but a single day; that at Chester, Ill., until the 6th; at Cairo until the 7th, while that at Hannibal, Mo., above the Wabash Bridge, remained until the 15th, the ice going out below the bridge, however, on the 7th. On the 29th the river was once more frozen over from St. Paul, Minn., to the bridge at Hannibal, and on the 30th there was floating ice as far as Cairo.

During the early days of the month new low water records were established at St. Louis and at Chester. At the former place a stage of —2.6 feet was recorded on the 2d, 1.9 feet lower than the record in any previous year, while at the latter place a stage of —4.1 feet was reached, 2.2 feet lower than that of any previous year.

Below the mouth of the Ohio the water fell until about the middle of the month, when a steady rise set in, which continued at the end of the month. South of Memphis, Tenn., and above New Orleans, La., the mean stage of water was over 5 feet higher than during December, 1899.

The Missouri was frozen during the entire month to above Omaha, Nebr., and at the latter place was closed by drift ice during the greater portion of the time. At Kansas City, Mo., the river was blocked from the 3d to the 5th, inclusive. At Hermann, Mo., 103 miles from the mouth of the river, there was a gorge from the 1st until the 7th, after which date the river was practically free from ice. Navigation was resumed at Hermann on the 15th and continued until the 29th, when it was again interrupted by ice.

The upper tributaries of the Ohio were closed by ice during the earlier days of the month, but were generally open by the 12th, and on the 16th navigation was resumed on the Monongahela as far as Greensboro, Pa. All river interests were warned of the coming of heavy ice by the official in charge of the Weather Bureau office at Pittsburg, Pa., and the necessary precautions were taken by those concerned.

The lower tributaries were also frozen until about the 10th, except the lower Tennessee, as was also the main stream from Wheeling to Parkersburg, W. Va., from the 2d until the 7th. A temporary gorge formed at Louisville, Ky., on the 1st. Floating ice was present in greater or less quantities through-

out the most of the month, and navigation was interrupted at various times except during the middle of the month.

After the 10th of the month there was a decided rise in the Ohio, ending at Pittsburg on the 22d and at Cairo on the 30th. The mean stages of water were from 1.5 to 7.5 feet higher than during December, 1899, except at Pittsburg.

In the Tennessee River navigation out of Chattanooga, Tenn., was closed from the 1st until the 11th, although there was but little ice after the 6th. The Cumberland at Burnside, Ky., was frozen until the 8th, and navigation from Nashville, Tenn., to the upper river was interrupted by floating ice until the 12th.

No ice was reported in the Arkansas River east of Wichita, Kans., and none at that place after the first week of the month.

In the Hudson River the ice moved south from Albany, N. Y., on the 21st, and gorged at Cedar Hill, N. Y., remaining so at the close of the month. There was a slight freshet on the 22d, and special river forecasts were made for several days.

The ice in the Susquehanna River at Harrisburg, Pa., went out on the 19th and at Wilkesbarre, Pa., on the 22d, but on the 30th the river was again frozen over at the latter place and heavy floating ice was passing the former. The West Branch of the Susquehanna and the Juniata were practically frozen over until the 20th, and again during the last few days of the month.

There was considerable ice in the Potomac during the early portion of the month, and small gorges were reported 40 miles below Washington, D. C., seriously interfering with navigation. A gorge formed about the middle of the month in the upper river at Greenspring, W. Va., but moved away without causing any damage.

The James was frozen from the 1st to the 5th, inclusive, and heavy rains on the 19th and 20th caused a sharp rise in the river, necessitating the issue of a local flood warning at Richmond, Va., on the 20th, which was fully justified. There was also a considerable rise in the Roanoke at the same time, amounting to 22 feet at Weldon, N. C., but no flood stages occurred.

There was a decided rise in the rivers of South Carolina about the middle of the month, but nothing of particular interest resulted.

The Oostenaula River at Resaca, Ga., was frozen over from the 2d to the 6th, inclusive, and on the 3d and 4th at Rome, Ga.

The rivers of Alabama rose rapidly during the second decade of the month, and reached nearly to the danger line at Demopolis, Ala., on the Tombigbee River. Warnings were issued wherever necessary.

Owing to heavy rains, the Sacramento River was in flood during the early days of the month, and the danger-line stage of 23 feet at Red Bluff, Cal., was exceeded by 1.7 foot on the 3d. The river went out of its banks at noon of the 2d, and on the 4th broke through the levee in two places near Princeton, Cal. Warnings of this flood were issued by the official in charge of the Weather Bureau office at San Francisco, Cal., and were given wide distribution. At Sacramento, Cal., a stage of 27 feet was reached on the 9th, 2 feet above the river danger line, and the river remained above the 25-foot stage from the 6th until the 18th, inclusive.

The Willamette River was also at a flood stage about the middle of the month, reaching 24 feet at Albany, Oreg., 4 feet above the danger line, and 16.7 feet at Portland, Oreg., 1.7 foot above danger line. Ample and accurate warnings of this flood were given by the official in charge of the Weather Bureau office at Portland.

The heavy rains also caused severe floods in the smaller rivers in Idaho and eastern Washington. About the 13th several lives were reported lost at Kendrick, Idaho, where the Potlatch River and Bear Creek converge into a narrow canon.

The damage to railroad and other property was estimated at \$500,000.

The thickness of ice in the rivers since December 4, 1899, is given in the following table. A few places show an increase since January 1, 1900, while some show a decrease, indicating a mild winter season. At the close of January, 1899, there were 3 inches of ice as far south as Kansas City, Mo., and 26 inches at La Crosse, Wis., while at the end of January of the current year there were but 9 inches at La Crosse, and very little below. Albany, N. Y., which had 10 inches at the end of January, 1899, had but 2.5 inches at the corresponding time of this year.

The highest and lowest water, mean stage, and monthly range at 125 river stations are given in Table XI. Hydrographs for typical points on seven principal rivers are shown on Chart V. The stations selected for charting are: Keokuk, St. Louis, Memphis, Vicksburg, and New Orleans, on the Mississippi; Cincinnati and Cairo, on the Ohio; Nashville, on the Cumberland; Johnsonville, on the Tennessee; Kansas City, on the Missouri; Little Rock, on the Arkansas; and Shreveport, on the Red.—*H. C. Frankenfield, Forecast Official.*

Thickness of ice in rivers (in inches), winter of 1899-1900.

Stations.	December.				January.				
	4	11	18	25	1	8	15	22	29
Moorhead, Minn.					12.0	19.0	21.0	24.0	26.0
Williston, N. Dak.	1.0	1.5	6.0	8.0	16.0	16.0	16.0		21.0
Bismarck, N. Dak.			1.5	9.0	16.0	17.0	17.0	15.0	17.0
Pierre, S. Dak.			1.5	8.5	14.0	15.0	10.5	8.0	14.0
Yankton, S. Dak.			5.0	7.0	10.0	11.0	10.5	8.5	10.0
Sioux City, Iowa				1.5	10.0	8.0	6.0		
Omaha, Nebr.					10.0				
St. Paul, Minn.					12.5		20.0	16.0	18.0
La Crosse, Wis.				5.0	10.0	9.0	7.5	6.0	9.0
Dubuque, Iowa			4.0	5.0	12.0	10.5	10.0		
Davenport, Iowa					8.0	9.0	6.0		
Keokuk, Iowa					10.0		5.0		
Hannibal, Mo.					8.0				
Topeka, Kans.					6.5				
Wichita, Kans.					2.0				
Pittsburg, Pa.					4.0				
Parkersburg, W. Va.					1.0	2.0			
Louisville, Ky.					5.0				
Columbus, Ohio					7.0	1.0			3.0
New Brunswick, N. J.						6.0			2.5
Bangor, Me.			2.0	2.0	4.5	8.0	9.0	12.0	14.0
Albany, N. Y.					4.0	5.0	8.5		2.5
Harrisburg, Pa.						3.0	3.0		
Philadelphia, Pa.					2.0	2.0			
Washington, D. C.					5.0				
Lynchburg, Va.					4.0	2.0			

## CLIMATE AND CROP SERVICE.

By JAMES BERRY, Chief of Climate and Crop Service Division.

The following extracts relating to the general weather conditions in the several States and Territories are taken from the monthly reports of the respective sections of the Climate and Crop Service. The name of the section director is given after each summary.

Rainfall is expressed in inches.

**Alabama.**—The mean temperature was 44.0°, or 0.6° below normal; the highest was 74°, at Opelika on the 9th, and the lowest, 6°, at Valleyhead on the 1st. The average precipitation was 3.34, or 1.68 below normal; the greatest monthly amount, 5.81, occurred at Citronelle, and the least, 0.78, at Tallassee.—*P. P. Chaffee.*

**Arizona.**—The mean temperature was 49.3°, or 5.1° above normal; the highest was 90°, at Arivaca on the 7th, and the lowest, 8°, at Fort Defiance on the 29th. The average precipitation was 0.24, or 0.55 below normal; the greatest monthly amount, 1.10, occurred at Dragoon, while none fell at a number of stations.—*W. G. Burns.*

**Arkansas.**—The mean temperature was 43.4°, or 4.6° above normal; the highest was 78°, at Washington on the 24th, and the lowest, 1°, at Pond on the 29th. The average precipitation was 2.69, or 2.40 below normal; the greatest monthly amount, 5.59, occurred at Jonesboro, and the least, 0.29, at Prescott.

The condition of wheat is reported to be excellent.—*E. B. Richards.*

**California.**—The mean temperature for the State, obtained by weighting the reports from 184 stations, so that equal areas have about the same weight, was 47.9°, which was 3.6° above the January normal for the State, as determined from 152 records; the highest was 90°, at Irvine, Orange County, on the 18th; the lowest, 12° below zero, at Bodie, Mono County, on the 9th. The average precipitation for the State, as determined by the records of 186 stations, was 3.30; the deficiency, as indicated by reports from 155 stations, which have normals, was 1.21; the greatest monthly amount, 12.27, occurred at Upper Matole, Humboldt County, while none fell at Salton, Riverside County.—*G. H. Willson.*

**Colorado.**—The mean temperature was 29.3°, or 5.4° above normal; the highest was 74°, at Los Animas on the 23d, and the lowest, 23° below zero, at Gunnison on the 11th. The average precipitation was 0.23, much below normal; the greatest monthly amount, 1.73, occurred at Ruby, while none fell at Garnet, Los Animas, and Vilas.—*F. H. Brandenburg.*

**Florida.**—The mean temperature was 55.9°, or 1.9 below normal; the highest was 84°, at Nocatee on the 10th, and the lowest, 13°, at Stephensville on the 4th. The average precipitation was 3.25, or 0.45 above normal; the greatest monthly amount, 5.25, occurred at Fort Meade and Lemon City, and the least, 0.44, at Wausau.—*A. J. Mitchell.*

**Georgia.**—The mean temperature was 44.3°, or 1.1° below normal; the highest was 75°, at Jesup on the 7th and 8th, and the lowest, 5°, at Dahlonga on the 2d and 30th. The average precipitation was 2.91, or 1.83 below normal; the greatest monthly amount, 5.64, occurred at Clayton, and the least, 1.65, at Augusta.

The weather during the month was favorable for farming and fruit interests.—*J. B. Marbury.*

**Idaho.**—The mean temperature was 30.1°, or 4.2° above normal; the highest was 63°, at Oakley on the 14th, and the lowest, 18° below zero, at Chesterfield on the 1st. The average precipitation was 1.52, or 0.37 below normal; the greatest monthly amount, 8.45, occurred at Kootenia, and the least, trace, at Oakley.—*S. M. Blandford.*

**Illinois.**—The mean temperature was 31.7°, or 5.4° above normal; the highest was 71°, at Shobonier on the 13th and at Raum on the 14th, and the lowest, 12° below zero, at Scales Mound on the 31st. The average precipitation was 1.27, or 1.07 below normal; the greatest monthly amount, 2.41, occurred at Equality, and the least, 0.16, at Philo.

Winter wheat is thus far thought to be unharmed, for the plant previous to the cold period at the end of the month was in splendid condition, green and vigorous.—*C. E. Linney.*

**Indiana.**—The mean temperature was 32.6°, or 5.6° above normal; the highest was 67°, at Mount Vernon on the 15th and 17th, and the lowest, 8° below zero, at Valparaiso on the 30th and at Hammond on the 31st. The average precipitation was 1.71, or 1.28 below normal; the greatest monthly amount, 4.20, occurred at Vevay, and the least, trace, at Hammond.

The mild weather during the month was very favorable for winter crops and farm work. The cold weather during a few days at the beginning of the month apparently caused but little injury, although most fields were without snow covering. Moderate temperature and occasional rain improved wheat in many fields not injured by the hessian fly, and made the wheat look green and vigorous. Freezing and thawing had caused some wheat fields to look brown, but the roots are firm and healthy. In some fields in the southern portion the wheat never looked better at the time of the year.—*C. F. R. Wappenhans.*

**Iowa.**—The mean temperature was 25.6°, or about 8.5° above normal; the highest was 66°, at Ottumwa on the 4th, and the lowest, 20° below zero, at Ruthven on the 29th. The average precipitation was 0.53, or 0.69 below normal; the greatest monthly amount, 2.47, occurred at Moorar, and the least, trace, at several stations.

January was phenomenally mild and pleasant, with much less than the usual number of stormy and wintry days. During a portion of the first half of the month the soil in the central and southern district was unfrozen, and for a number of days plowing operations were carried on in numerous localities. The conditions were especially favorable for stock feeding, and securing the forage in the cornfields.—*J. R. Sage, Director; G. M. Chappel, Assistant.*

**Kansas.**—The mean temperature was 35.3°, or 6.6 above normal; the highest was 75°, at Coolidge on the 13th, and the lowest, 8° below zero, at Colby on the 28th. The average precipitation was 0.22, or 0.63 below normal; the greatest monthly amount, 1.06, occurred at Yates Center, while none fell at Emporia, Lakin, Lebanon, and Scott.

The ground continued moist through the month, and much of the spring plowing was done during the warm weather. Wheat is in very good condition; much of it has been pastured to prevent stooling; some